

Preface

The main goal of the book is a coherent treatment of the theory of propagating in materials nonlinearly elastic waves of displacements, which corresponds to one modern line of development of the nonlinear theory of elastic waves.

The book can be conditionally divided on five basic parts: the necessary information on waves and materials; the necessary information on nonlinear theory of elasticity and elastic materials; analysis of one-dimensional nonlinear elastic waves of displacement—longitudinal, vertically and horizontally polarized transverse plane nonlinear elastic waves of displacement; analysis of one-dimensional nonlinear elastic waves of displacement—cylindrical and torsional nonlinear elastic waves of displacement; analysis of two-dimensional nonlinear elastic waves of displacement—Rayleigh and Love nonlinear elastic surface waves. In addition, the book includes all the necessary components of scientific book: the contents, foreword, the reference list in each chapter, afterword.

The auditory of this book is assumed as the moderately educated in the field of mechanics and mathematics. Sometimes the presence of elementary knowledge only will be insufficient for understanding the book. In the field of mechanics, the knowledge of fundamentals of continuum mechanics will be required, which in turn are available on conditions that elements of a row of other divisions of mechanics are known. In the field of mathematics, the elements of knowledge of the full university course (mathematical analysis, analytical and differential geometry, theory of functions of complex variable, vector and tensor calculation, higher algebra) will be required.

The book is addressed first of all to people working in solid mechanics—from students at an advanced undergraduate and graduate level to scientists, professionally interesting in waves. But mechanics is understood in the broad sense, when it includes mechanical and other engineering, material science, applied mathematics and physics and so forth.

The genesis of this book can be found in author's years of research and teaching while a head of department at SP Timoshenko Institute of Mechanics (National Academy of Sciences of Ukraine), a member of Center for Micro and Nanomechanics at Engineering School of University of Aberdeen (Scotland) and a professor at Physical-mathematical Faculty of National Technical University of Ukraine "KPI."

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Rushchitsky, J.J.

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